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☐ 1. Document ID: US 5980796 A

L1: Entry 1 of 6

File: USPT

Nov 9, 1999

US-PAT-NO: 5980796

DOCUMENT-IDENTIFIER: US 5980796 A.

TITLE: Process for producing molded parts by polymerization of lactams in molds

DATE-ISSUED: November 9, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Nussdorfer; Bernd-Klaus	Geldern			DEX
Peiffer; Albrecht	Meerbusch			DEX
Titzschkau; Klaus	Wustenrot			DEX

US-CL-CURRENT: 264/85; 264/102, 264/257, 264/258, 264/310, 264/DIG.56, 528/323

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWOC	Draw Desc	Image
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☐ 2. Document ID: US 4229556 A

L1: Entry 2 of 6

File: USPT

Oct 21, 1980

US-PAT-NO: 4229556

DOCUMENT-IDENTIFIER: US 4229556 A

TITLE: Reactive oligomers as curing agent for unsaturated polyester

DATE-ISSUED: October 21, 1980

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Braun; Dietrich	Darmstadt-Arheilgen			DEX
Titzschkau; Klaus	Darmstadt			DEX

US-CL-CURRENT: 525/445; 525/25, 525/437, 525/447, 528/362

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	KWOC	Draw Desc	Image
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☐ 3. Document ID: JP 07188433 A

L1: Entry 3 of 6

File: JPAB

Jul 25, 1995

K000	Drawn Desc	Image
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Oct 21, 1980

EUR-CL (EPC): C07C121/66; C08F004/00, C07C121/66

KDAC	Drawn Desc	Image
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Term	Documents
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TITZSCHKAUS	0
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KLAU[DWPI,EPAB,JPAB,USPT,PGPB]	31
(TITZSCHKAU ADJ (KLAUS[IN])). USPT,PGPB,JPAB,EPAB,DWPI,TDBD.	6

6

12:4:01 5:15 PM



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L9: Entry 9 of 24

File: USPT

Nov 10, 1981

DOCUMENT-IDENTIFIER: US 4299926 A

TITLE: Polymeric light stabilizers for plastics

Rody et al

BSPR:

Condensation polymers and addition polymers are to be understood as those polymers or oligomers which are manufactured by a polycondensation reaction or polyaddition reaction and possess hetero-atoms in the polymer chain. Examples of such polymers are polyesters, polyethers, polyamides, polyamines, polyurethanes, polyureas, polysulphides, polysulphones, polyimides, polysulphonates, polyphosphates, polyphosphonates, polysilyl esters, polysiloxanes, polyhydrazides, polyhydrazones or polybenzimidazoles.

BSPR:

The invention relates above all to polyesters, polyamides, polyurethanes, polyureas, polysilyl esters, polyethers, polyamines, polycarbonates and copolymers thereof, the recurrent molecular unit of which contains a polyalkylpiperidine radical of the formula ##STR3## or is substituted by a polyalkylpiperidine side group of the formula ##STR4## in which R denotes hydrogen or alkyl with 1-5 C atoms and R' denotes hydrogen, alkyl with 1-12 C atom, allyl, benzyl, acetyl, acryloyl or crotonyl.

BSPR:

The invention relates above all to polyesters, polyamides, polyurethanes, polyureas, polysilyl esters and copolymers thereof, the recurrent molecular unit of which contains a polyalkylpiperidine radical of the formula ##STR5## or is substituted by a polyalkylpiperidine side group of the formula ##STR6## in which R denotes hydrogen or alkyl with 1-5 C atoms and R' denotes hydrogen, alkyl with 1-12 C atoms, allyl, benzyl, acetyl, acryloyl or crotonyl.

BSPR:

When X and X' are oxygen, the compounds of the formula I and II represent polyesters, and when X and X' are NY they are polyamides. When X and X' are oxygen, the compounds of the formula Ia represent polyurethanes; when X and X' are NY, they are polyureas; and when X and NY and X' is oxygen, they are polyurethane-ureas. The compounds of the formula III represent polysilyl esters. The compounds of the formula IV and V represent polyethers. The compounds of the formula VI represent polycarbonates or polyureas depending on whether X denotes oxygen or NY. The compounds of the formulae IVa and VII represent polyamines. Amongst all the compounds which contain --NY-- in the main chain, those in which Y is hydrogen are preferred.

BSPR:

When one of the radicals A, B, D, E or F contains an additional ether group, amine group, ester group, amide group, urethane group or urea group, the compounds can represent copolymers. When, for example, B in the formula I contains a urea group, the compounds of the formula I represent polyester-ureas or polyamide-ureas depending on the meaning of X and X'.

BSPR:

Polyamides of the formula I in which X and X' denote NY and Y represents alkyl with 1-12 C atoms, cyclohexyl, benzyl or a polyalkylpiperidine radical of the formula VIII, but preferably represents hydrogen, A denotes one of the radicals of the formulae IX to XVII and B represents an alkylene radical with 2-12 C atoms, arylene with 6-12 C atoms, xylylene, hexahydroxylylene, a cyclohexylene or 4,4'-dicyclohexylmethane radical or a radical -phenylene-Z.sup.4 -phenylene- in which Z.sup.4 can be --CH.sub.2 --, >C(CH.sub.3).sub.2, --O-- or --SO.sub.2 --.

BSPR:

These polyamides are prepared by a polycondensation reaction of polyalkylpiperidine-dicarboxylic acids, such as were listed in sub-group 1, or of amide-forming derivatives thereof, with diamine components of the formula B(NHY).sub.2. Examples of amide-forming derivatives of dicarboxylic acids are the esters of acid chlorides thereof, above all lower alkyl esters, for example the dimethyl or diethyl esters. Examples of diamines which can be used are ethylenediamine, 1,6-diaminohexane, 1,12-diaminododecane, m- and p-phenylenediamine, 2,4-diaminotoluene, 4,4'-diaminodiphenylmethane, 4,4'-diaminodiphenyl ether, 4,4'-diaminodiphenylsulphone, p-xylylenediamine, 1,4-diaminocyclohexane, 4,4'-diamino-dicyclohexylmethane, N,N'-dimethyl-hexamethylenediamine, N-(2,2,6,6-tetramethylpiperidin-4-yl)-hexamethylenediamine, N,N'-dicyclohexyl-pentamethylenediamine, N,N'-bis-(2,2,6,6-tetramethylpiperidin-4-yl)-hexamethylenediamine or N,N'-dimethyl-p-phenylenediamine. The reaction of the dicarboxylic acids--or derivatives thereof--with the diamines is carried out in an approximate molar ratio of 1:1 by the methods known for the preparation of polyamides. As long as the polyamides thus obtained are not cyclic, their end groups are predominantly amino groups and carboxyl groups or carbalkoxy groups.

BSPR:

Examples of polyamides of this type, in which the dicarboxylic acid radical A contains a polyalkylpiperidine radical, are the following compounds: ##STR20##

BSPR:

Polyamides of the formula I in which X and X' are NY and preferably NH, A has the same meaning as in sub-group 3 and B denotes one of the radicals XXXI to XXXIX ##STR26## in which, R, R', Z and Z.sup.2 have the meaning indicated in sub-group 1 and B", R.sup.5 and Z.sup.5 have the meaning indicated in sub-group 3, Z.sup.8 denotes an alkylene radical with 1-6 C atoms or phenylene and X" denotes oxygen or NH.

BSPR:

These polyamides are prepared by a polycondensation reaction of customary dicarboxylic acids, such as were mentioned under (3), or of dicarboxylic acids containing polyalkylpiperidine, such as were listed under 1a-h, or of the amide-forming derivatives thereof with diamines of the formula

BSPR:

The compounds of the formula I in which X is NY and X' is NH or NY, A has the same meaning as in sub-group 4, B has the same meaning as in sub-group 2 and Y is a polyalkylpiperidine radical of the formula XL, ##STR27## in which R and R' have the same meaning as in sub-group 1, are a special category of polyamides.

BSPR:

These polyamides are prepared by a polycondensation reaction of customary dicarboxylic acids with diamines of the formula ##STR28## wherein B has the meaning indicated above.

BSPR:

Examples of polyamides of the sub-group 4 are the following formulae: ##STR29##

BSPR:

Polyamides of the formula II in which X is NH and --X--D--CO-- represents a group of the formulae LX, LXI or LXII. ##STR35## in which m, R and R' have the same meaning as in sub-group 1 and Z.sup.9 has the same meaning as in sub-group 5a.

BSPR:

Polyamides of this type are obtained by a polycondensation reaction of aminocarboxylic acids of the formula H.sub.2 N--D--COOH or esters thereof.

BSPR:

Examples of polyamides of the formula II are given in the following formulae: ##STR36##

BSPR:

When known stabilisers are used in addition, synergistic effects can arise, and

this is frequently the case especially when other light stabilisers or organic phosphites are used in addition.

BSPU:

(b) Polyamides of the formula I in which X and X' denote NH, B has the meaning given in sub-group 2 and A represents one of the radicals XIV, VX or X' in which R and R' denote hydrogen or methyl, Z is a direct bond and m, Z_{sup.1}, Z_{sup.2} and B' have the meaning given in sub-group 1.

BSPU:

(e) Polyamides of the formula I in which X and X' are NH, A represents al with 1-12 C atoms or arylene with 6-12 C atoms and B represents a radical formula XXXVI or XXXVIII in which R and R' are hydrogen or methyl, Z represents a direct bond and Z_{sup.5} is alkylene or alkenylene with 4-8 C atoms or p-aryl

BSPU:

(f) Polyamides of the formula I in which X is NY and X' is NH or NY, Y is a tetramethylpiperidine radical of the formula XLa ##STR56## A denotes alkylene with 1-12 C atoms or arylene with 6-12 C atoms and B denotes alkylene with 2-12 atoms, arylene with 6-12 C atoms, 4,4'-dicyclohexylene-methane or phenylene-Z_{sup.4}-phenylene in which Z_{sup.4} represents --CH_{sub.2}-- , >C(CH_{sub.3})_{sub.2}, --O-- or --SO_{sub.2}--.

BSPU:

16. Polyamides and copolyamides which are derived from diamines and dicarboxylic acids and/or from aminocarboxylic acids or the corresponding lactams, such as polyamide 6, polyamide 6/6, polyamide 6/10, polyamide 11 and polyamide 12.

DEPR:

56.4 g of compound A are initially introduced into 500 ml of chloroform at room temperature. A solution of 18.3 g of adipic acid chloride dissolved in 50 ml of chloroform is added dropwise to this mixture in the course of about 2 hours. The mixture is then stirred exhaustively for 3 hours at room temperature and for 1 hour at 50.degree.. After cooling to room temperature, 300 ml of 10% strength sodium hydroxide solution are added to the viscous chloroform solution and the mixture is stirred intensively for 3 hours. The aqueous phase is separated off and the chloroform solution is now poured slowly into 2 l of hexane, whilst stirring well. The polymer, which separates out as a colourless resin, is separated from the solvent, taken up in 300 ml of chloroform and precipitated again with hexane. The resin which separates out is dried for 24 hours at 60.degree. under a high vacuum (0.1 mm). The resulting polyamide (Compound No. 13) is a resin which can be powdered and has a sintering point of about 92.degree., an average molecular weight of about 6,100 and a water content of 2.4%.

DEPR:

42.5 g of N,N'-bis-[1-(2-hydroxyethyl)-2,2,6,6-tetramethyl-4-piperidyl]-sebacamide (melting point 182.degree.-83.degree., prepared from N,N'-bis-(2,2,6,6-tetramethyl-4-piperidyl)-sebacamide and 2 mols of ethylene oxide) are warmed with 13.0 g of dimethyl adipate and 0.5 g of lithium amide in 100 ml of xylene, first to 100.degree. for 2 hours, then to 120.degree. for 2 hours and subsequently to 140.degree. for a further 18 hours, under a gentle stream of nitrogen. During the entire reaction time, the methanol formed is distilled off as a mixture with a little xylene. The viscous solution is diluted with 100 ml of xylene and poured into 2 l of hexane. The resin which separates out is dissolved in 300 ml of toluene and precipitated again using hexane and then dried for 24 hours at 80.degree. under a high vacuum (0.1 mm). After cooling, a resin which can be comminuted to give a slightly yellowish powder is obtained. The resulting polyester-polyamide (Compound No. 14) sinters at about 135.degree. and has a molecular weight (vapour pressure method) of about 3,600.

DEPR:

79 g of 1,6-bis-(2,2,6,6-tetramethyl-4-piperidylamino)-hexane are dissolved in 400 ml of chloroform. A solution of 36.6 g of adipic acid chloride in 50 ml of chloroform is added dropwise to this solution at room temperature in the course of about 90 minutes. The reaction mixture is stirred exhaustively for 15 hours at room temperature and then for 2 hours at 50.degree.. After cooling to room

temperature, 300 ml of 2 N sodium hydroxide solution are added to the reaction solution and the mixture is stirred intensively for 4 hours. The aqueous phase is separated off and the chloroform solution is washed with twice 300 ml of water and then poured into 2 l of hexane. The resin which separates out is dissolved in 300 ml of chloroform and again precipitated using hexane. The resulting polyamide (compound No. 15) is dried for 24 hours at 60.degree./0.1 mm. It can be ground to a virtually colourless powder which sinters at about 140.degree. and has an average molecular weight of about 4,500.

DEPR:

A polyamide (compound No. 16) which has an average molecular weight of about 1,500 and sinters at about 40.degree. can be isolated from the hexane/chloroform solution by evaporation.

CLPR:

22. A stabilised plastic according to claim 14 wherein the plastic is selected from the group consisting of polyolefine, styrene polymer, polyurethane or polyamide.

CLPR:

23. A stabilised plastic according to claim 15 wherein the plastic is selected from the group consisting of polyolefine, styrene polymer, polyurethane or polyamide.

CLPR:

24. A stabilised plastic according to claim 16 wherein the plastic is selected from the group consisting of polyolefine, styrene polymer, polyurethane or polyamide.

CLPR:

25. A stabilised plastic according to claim 17 wherein the plastic is selected from the group consisting of polyolefine, styrene polymer, polyurethane or polyamide.